Happy $\pi$ Day! In the multiplication problem below, each character (P, I, *, $\sim, \#$ ) stands for a single digit (and no two characters represent the same digit). Find the digit that each character represents.

[Please fully explain your answer.]
Solutions should be submitted to Cinda Furry, in Gardner Hall 435, by 4:00 P.M. on Wednesday, March 21, 2018.

